

Application No. 10/645,333
Filed: August 21, 2003
TC Art Unit: 1742
Confirmation No.: 7603

REMARKS

Claims 1-10 are pending. Claim 1 is currently amended to claim "A method for producing by injection molding a composite metal product ...". New claims 9 and 10 are added.

Examiner Interview 1/18/07

Applicant's attorneys appreciate the Examiner's courtesy in a telephone conference on January 18, 2007, discussing the pending Office Action. The amendment to the claims and the traverse and remarks set forth below are responsive to both the office action and the Examiner's comments in this conference.

Claim Rejections Under 35 USC 103(a)

The Examiner has rejected claims 1-8 under 35 U.S.C. 103(a) as being unpatentable over Kato et al. in view of Withers et al. and Jin et al. The Examiner acknowledges that Kato alone does not make the invention obvious. Applicant respectfully traverses this continuing rejection on the basis that Kato is improperly combined with Withers and/or Jin to form the rejection. The patent laws require that the Examiner's references be analogous prior art. To meet this requirement, Section 2141.01(a) of 35 USC 103 requires the reference must be either in the field of applicant's endeavor

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or, if not, then be reasonably pertinent to the particular problem with which the invention was concerned.

The field of Applicant's endeavor

The applicant's invention relates to a method for producing a composite metal product comprising a carbon nano material and a metal material by injection molding.

The particular problem with which the invention was concerned

Applicant describes that metal parts of electronic equipment such as heat sinks, shields and bearings, and the like are difficult to be molded, a problem that is solved by applicant's method as claimed. One of the particular problems with which the applicant's invention was concerned relates to molding difficulty encountered in conventional hot pressing of pulverized mixtures (particle size 5 micron to 1 nanometer) of carbon nano material and metal powder to produce composite metal products. Additionally, it is a desired object of the invention to improve functions required for the product parts, such as high heat conductivity, excellent electric conductivity and low friction (excellent slidability), and to improve these functions in metal products without being limited by the size and shape of the product. Specifically, to solve these problems, the applicant has

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developed a novel compositing and molding method for enabling a carbon nano material to be composited with a metal material by injection molding. (Specification page 1, line 20 to page 2 line 8).

Withers is not analogous art

Withers is not analogous art because Withers is not in the field of applicant's endeavor and Withers is not reasonably pertinent to the particular problem with which the invention was concerned.

The field of endeavor of the Withers patent relates to improvements in the composition and manufacture of golf club heads, using a squeeze-cast method and certain methods of surface hardening (Col 1, lines 5-15). The patent is listed under Int'l class B22F 3/26, under U.S. class 419/27; 419/12; 419/14; and under Field of Search 419/10,12,14, 419/27). Withers has no relation to injection molding of composite metal parts, wherein the metal parts can be used in electronic equipment such as heat sinks, shields and bearings, and the like that are otherwise difficult to be molded, and wherein functions of heat conductivity, low friction, molding accuracy and/or uniform quality are desired.

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Withers is not reasonably pertinent to the particular problem with which the invention was concerned. Withers addresses weight, hardness, wear resistance, impact strength, shear strength and torsional modulus (Col 1, lines 30-40). Withers has no relation to problems of fabrication encountered in hot-pressing and/or in injection molding, nor to functions in a metal product of heat conductivity, low friction, molding accuracy and/or uniform quality.

Jin is not analogous art

Jin is not analogous art because Jin is not in the field of applicant's endeavor and Jin is not reasonably pertinent to the particular problem with which the invention was concerned.

The field of endeavor of the Jin patent relates to an improved process for fabricating nanotube field emitter structures, in which nanotubes protrude from a supporting base material to improve emission properties. More particularly, Jin consolidates nanotubes and metal powder into a hot-pressed ingot, and then cuts, grinds or sections away a layer of the ingot to expose a roughened surface to improve field emissive properties. The patent is listed under Int'l class H01J, under U.S. class 445/51; 313/495; 313/306; and under Field of Search 445/24,50,51,

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313/495, 496, 306, 307, 308, 309). Jin is not forming a metal product by hot-pressing, or by molding and certainly not by injection molding. Jin merely hot-presses an ingot as an intermediary step in a process to create exposed ends of nanotubes above a composite surface.

Jin is not reasonably pertinent to the particular problem with which applicant's invention was concerned. Jin addresses creating protruding carbon nanotube field emitter structures (Col 3, lines 6-24); and Jin is concerned with improving field emissions owing to the protruding geometry. Jin's disclosed method is not pertinent to issues of injection molding of composite metal parts, nor to attendant problems of molding accuracy and/or uniform quality. Further, Jin's method relates to "stable electrical and mechanical contact between nanotube emitters and the underlying metal cathode ... providing efficient electron transport to the emitter surface with low resistive heating [...] (Col 3, lines 40-45)"; however, this is not pertinent to functions of heat conductivity and low friction in injection molded composite metal parts.

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No motivation to combine Kato with Withers and/or Jin to arrive at the Applicant's invention

Applicant respectfully submits that the Examiner is reasoning by hindsight from Applicant's disclosure to pick unrelated pieces and steps from unrelated, non-analogous art in order to craft the instant rejection.

There does not exist any motivation to combine Kato with Withers and/or Jin to arrive at the Applicant's invention. Holding Kato in hand, for instance, one skilled in the art would not have found reason, suggestion or motivation to find or examine Withers and/or Jin in order to solve the problems that Applicant was addressing. First, Kato is in a completely different field of endeavor relative to Withers or Jin. The Kato patent is listed under Int'l class B22D 17/00, B22D 25/00, under U.S. class 164/113; 164/900; and under Field of Search 164/113, 900, 164/303. Kato is concerned with an injection molding method, namely melting a metallic feed in a solid state by heating it from the outside and by a friction and a shearing generated by a rotation of a screw, with connection to an injection of the resulting melted metallic feed. One skilled in the art, holding Kato in hand and being focused on solving the problems that the applicant was addressing (see above), would have had no motivation at the time of the invention to search out and examine Withers dealing with

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methods of squeeze-casting a golf club or Jin dealing with methods of fabricating a surface-roughened field emitter structure.

The Examiner has agreed with the Applicant that Kato does not teach the limitations of applicant's claim 1 regarding to the steps labeled a) b) and c). The Examiner admits that Kato and Withers are silent with regard to the method of forming a composite of metal and carbon nano material (O.A., page 3, paragraph 2). Jin does not disclose the steps of (d), (e) and (f) of the present invention. The limitations of the Applicants claim 1 are not taught or suggested by the references, even in combination, where no obviousness rejection is appropriate owing to the references cited by the Examiner not being analogous art.

For the reasons above, the Applicant respectfully requests that the rejection of claims 1-8 be withdrawn.

New claims 9 and 10

New claims 9 and 10 claim method and product respectfully in which are present one or more of the properties of high heat conductivity, low friction, high molding accuracy and high uniform quality. These are functional characteristics that are not disclosed or suggested by the references, separately or in combination.

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REMARKS

Claims 1-10 are pending. Examiner's rejections have been traversed. This Response puts the claims into proper form for allowance, which allowance is requested.

The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

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